

VSF

VETRONICS SIMULATION FACILITY

VETRONICS SIMULATION FACILITY OVERVIEW DECEMBER 11, 1997

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<http://www.tacom.army.mil/Technology/Labs/VetronicsSim.html>

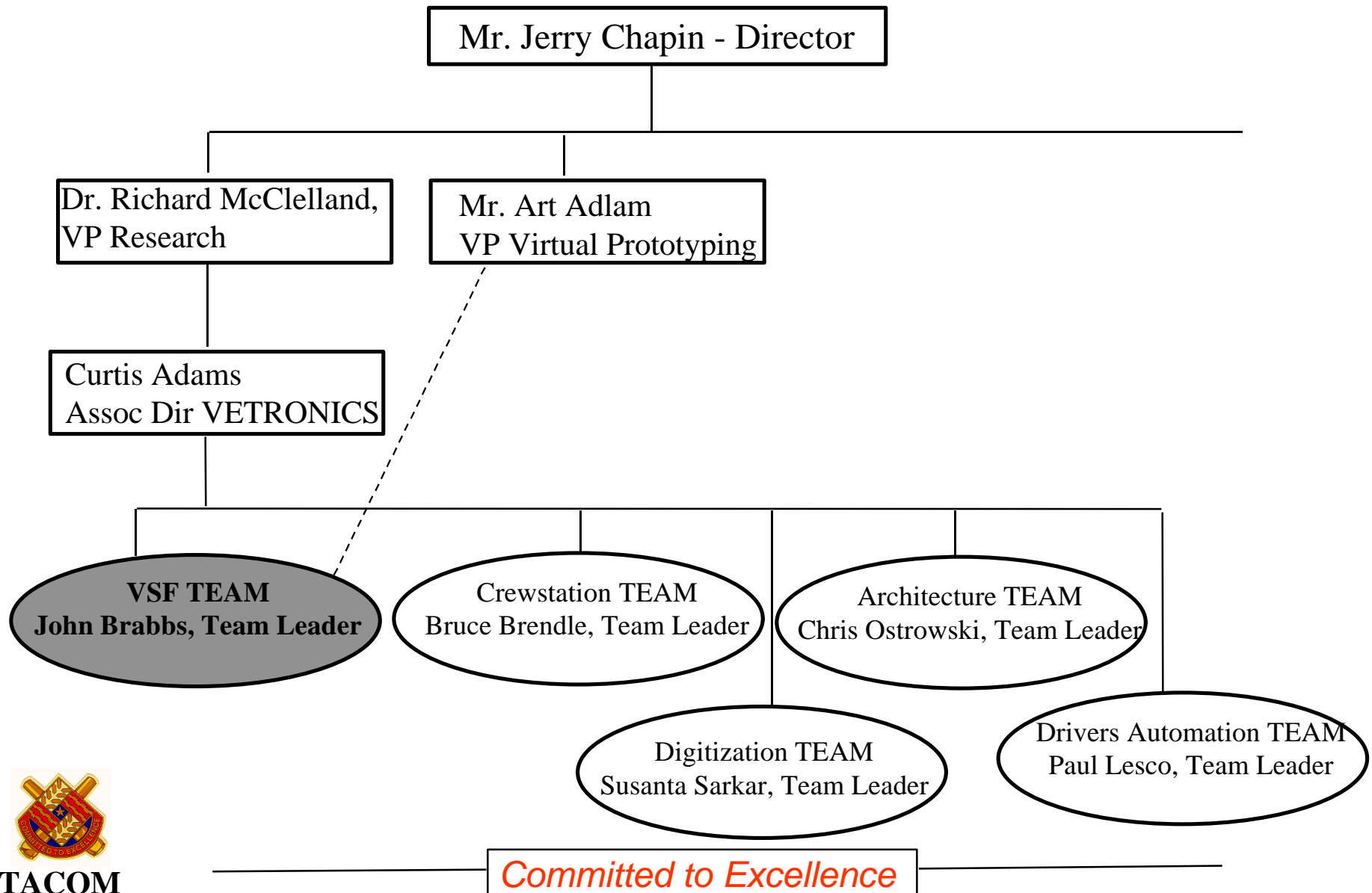


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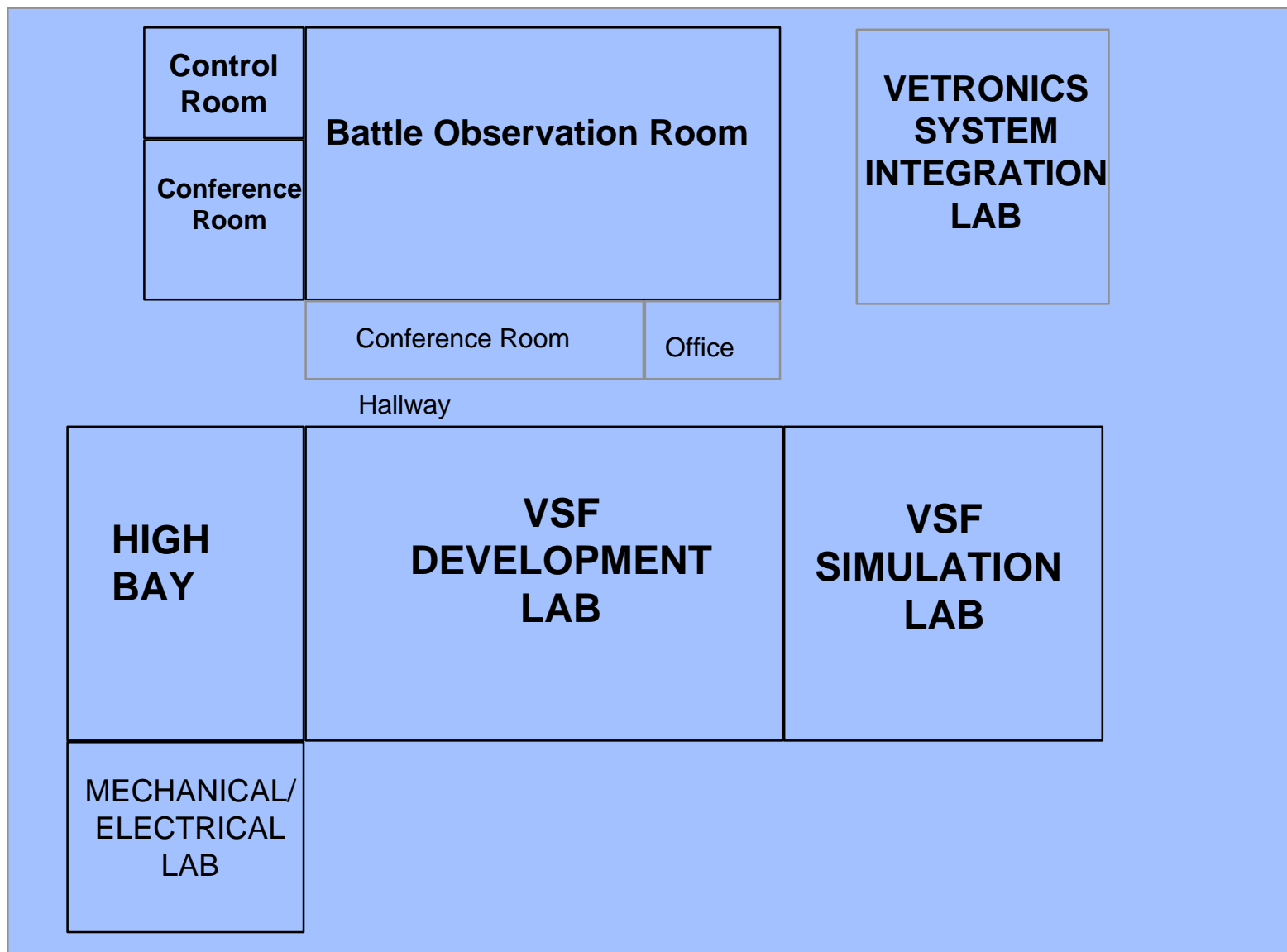
- TARDEC
- VETRONICS TECH CENTER
- VSF OVERVIEW
- VSF PROJECTS
 - Embedded Simulation
 - Physical Simulation Lab
 - HLA





VSF

VETRONICS TECHNOLOGY CENTER



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Develop and support a simulation facility to investigate the research and development of ground vehicles. The facility will develop a reconfigurable and evolvable architecture that can be easily tailored to support specific program needs and the Soldier-In-The-Loop portion of TARDEC's Virtual Prototype Process.



- (1) Hardware/Software Reconfigurable Crewstation Simulator**
 - Bradley Simulator
 - HMMWV Simulator
 - Advanced Abrams Crewstation Simulator
 - Future Crewstation Simulator
- (2) Controller/Stealth System**
- (3) Simulation Support Tool**
 - MODSAF 3.0
 - ITEMS 4.0
- (4) Defense Simulation Internet (DSI) Node**
- (5) Electrical/Mechanical Lab**



VSF LAB DIAGRAM

BRADLEY



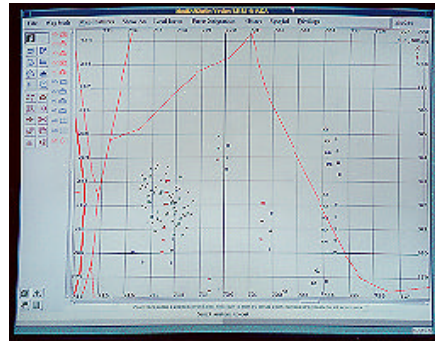
FUTURE CREWSTATION



DIS Protocol



STEALTH



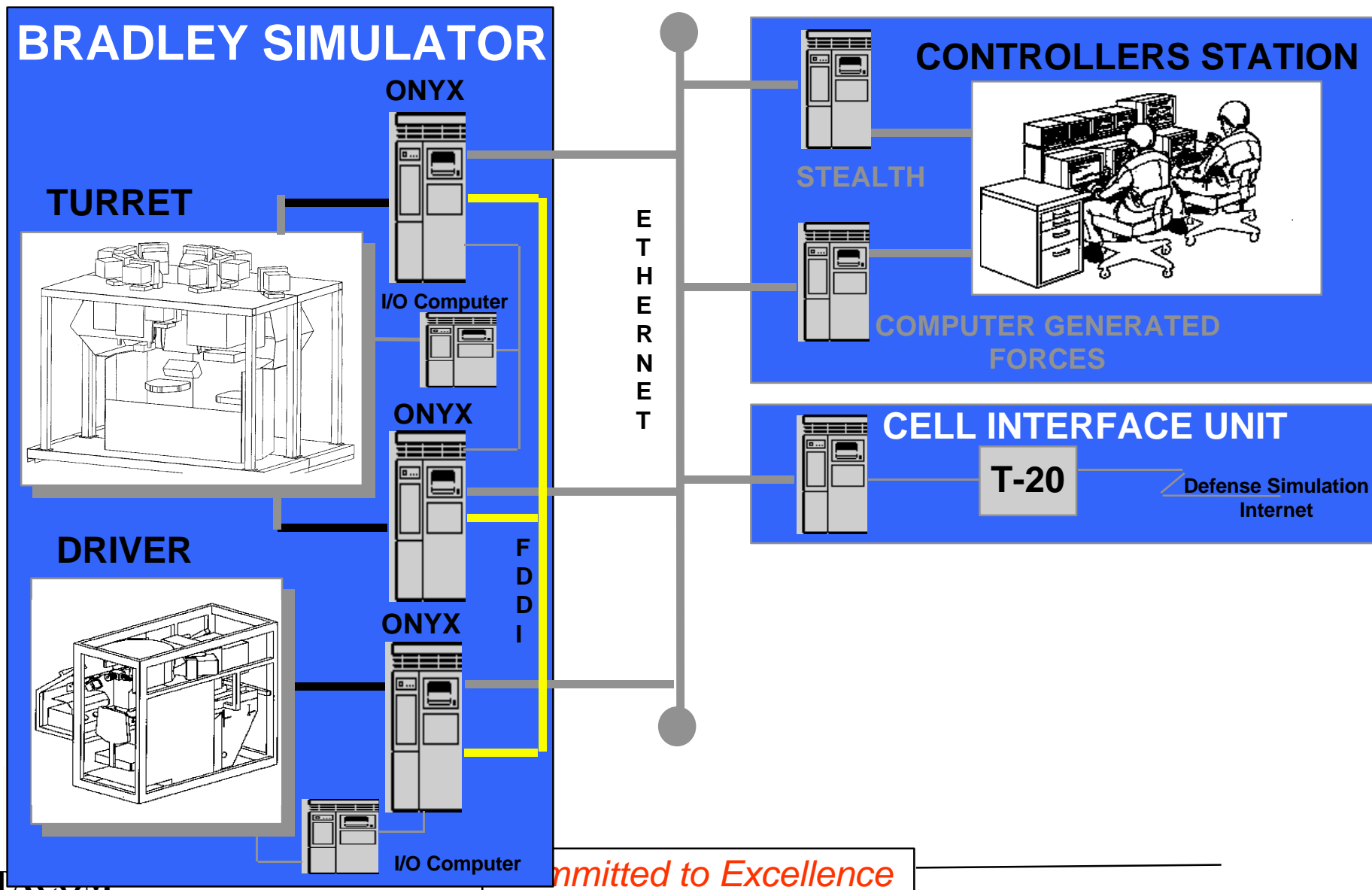
CGF



HMMWV

VSF

VSF BRADLEY SIM DIAGRAM



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VSF SW & HW Configuration

- **SOFTWARE**
 - **VSF WORLD/VISUALS - SGI Performer 2.0**
 - **VSF Terrain Databases: Hunter Liggett, SW ASIA, FT HOOD**
 - **Soldier Machine Interface - Designers WorkBench**
 - **Command & Control System - VAPS**
 - **Sound System - AudioWorks**
 - **Mobility, Weapon Systems, DIS Interface, Vulnerability, Process Interface Unit - C/C++**
- **HARDWARE**
 - **SGI ONYX2, ONYX, Indigo2, Indy**
 - **SINGARS Simulator**
 - **Ethernet, FDDI, Reflective Memory**
 - **Advanced Abrams, Bradley, Future Combat System, HMMWV**
 - **AudioWorks**



Simulation Support TOOLS

- **DIS TOOLS**
 - **Computer Generated Forces (ITEMS & MODSAF)**
 - **Stealth System**
 - **Data Loggers (DIS, IST, Stealth)**
 - **Simulation Manager**
 - **VV & A Test Tools**
 - **Radio Simulator**
 - **Cell Interface Unit**
- **Database Development (Terrain & Objects)**
 - **Multigen**
- **Defense Simulation Internet Node**
- **Secure Room**



TARDEC DIS DEMONSTRATIONS/EXPERIMENTS

- LOUISIANA MANEUVERS (LAM) DEMONSTRATION
 - 24-27 MAY 1993
 - LONG HAUL DEMO AT ORLANDO, FL
 - TACOM (VSF), ATCOM (CSRDF), FT RUCKER(AVTB), SIKORSKY
- AUSA DEMONSTRATION
 - 18-20 OCTOBER 1993
 - LOCAL DEMO AT AUSA IN WASHINGTON, D.C.
- I/ITSEC CONFERENCE 1993
 - 29 NOV - 3 DEC 1993
 - LONG HAUL DEMO AT ORLANDO, FL
 - VSF WAS LOCATED AT TACOM, WARREN, MI LINKED VIA DSI
- US/UK LONG HAUL DEMONSTRATION
 - 2-6 MAY 1994
 - LONG HAUL DEMO WARREN, MI & LONDON, ENGLAND
- AUSA DEMONSTRATION 94
 - 15-20 OCTOBER 1994
 - LONG HAUL DEMO TACOM, FT RUCKER SIKORSKY, & UK
- A2ATD EXPERIMENT #3 SEP-OCT 1995
- CREWMAN ASSOCIATE EXPERIMENTS MAR-NOV 1996



FY98 VSF PROJECTS

- InterVehicle Embedded Simulation Technology (INVEST) Support
- Physical Simulation Lab/VSF Integration
- Co-development of the ACT II Future Scout Crewstation Simulator
- Night Vision Labs Sensor Integration
 - Developing a joint TARDEC/NVL World
- High Level Architecture Project
 - Implement DIS/HLA Gateway
 - VSF HLA Compliant
 - Create HLA TARDEC documentation
 - Research best TARDEC Architecture for integrating labs



VSF

Embedded Simulation

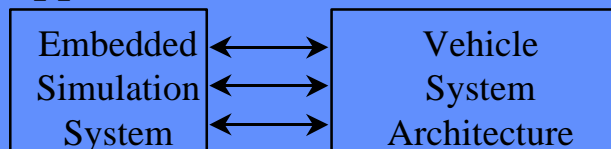


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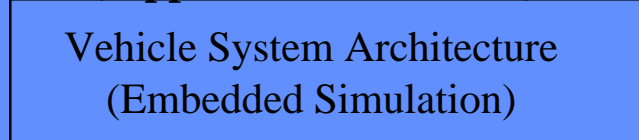
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Embedded Simulation Approaches

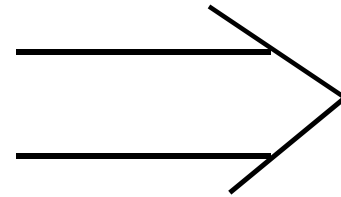
Approach 1: Stand-Alone ESS LRU (support current vehicles)



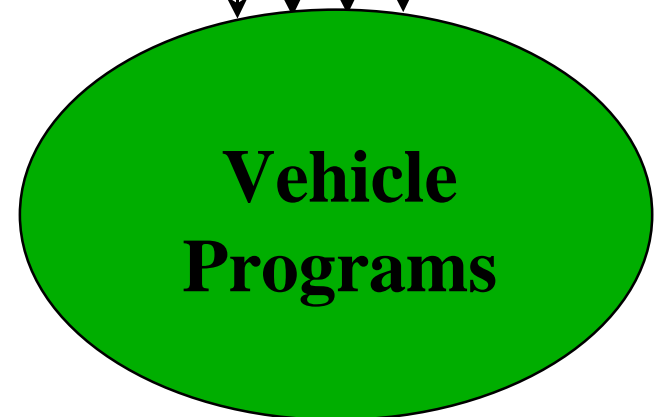
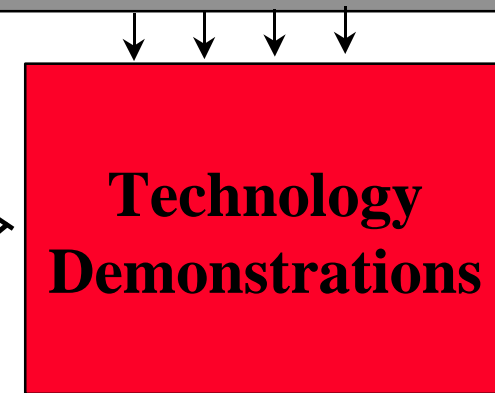
Approach 2: ESS Components within Veh Arch (support future vehicles)



Approach 3: Hybrid ESS (support both current & future vehicles)

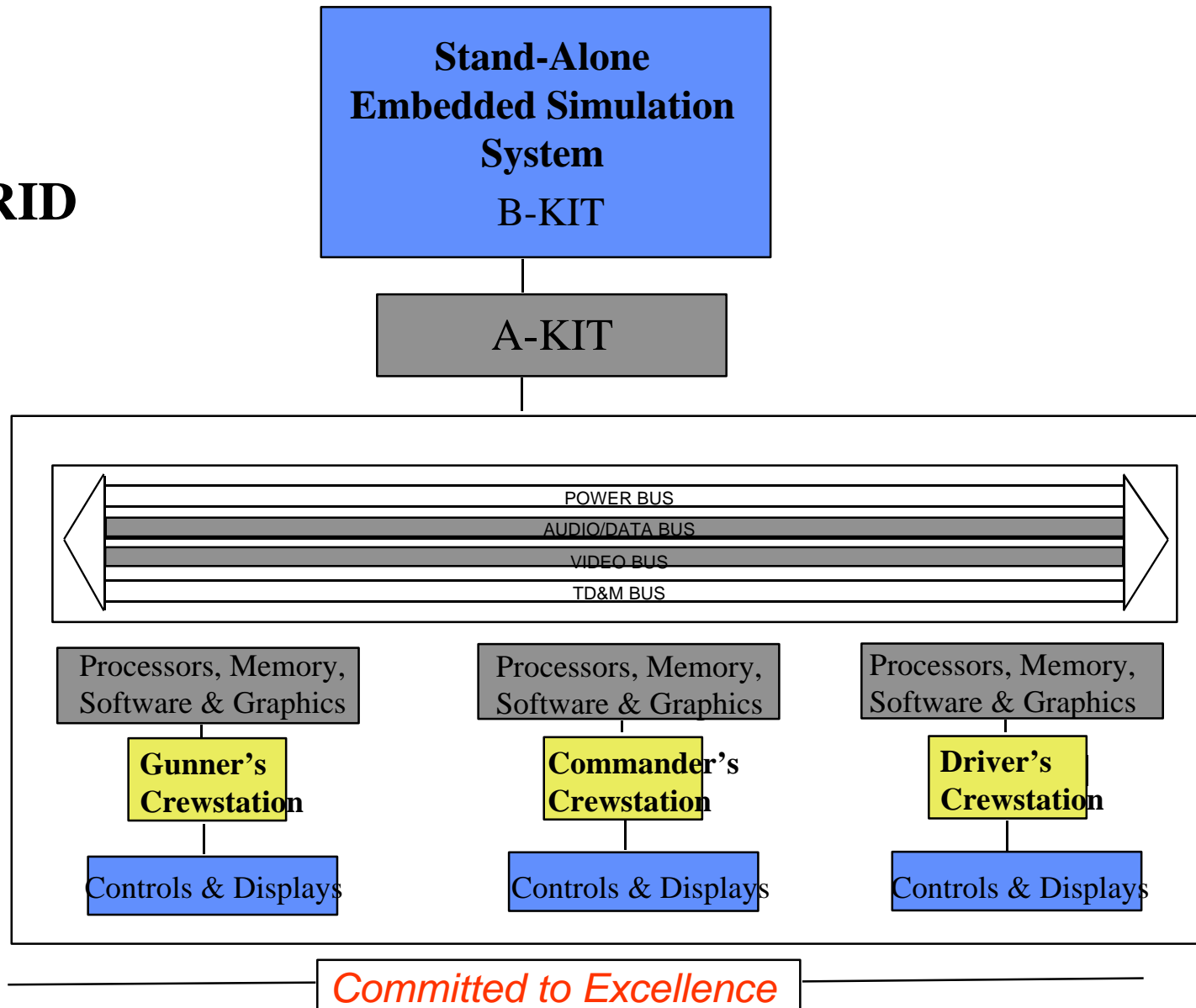


Define & Quantify Tech Barriers



Embedded Simulation Approach#3

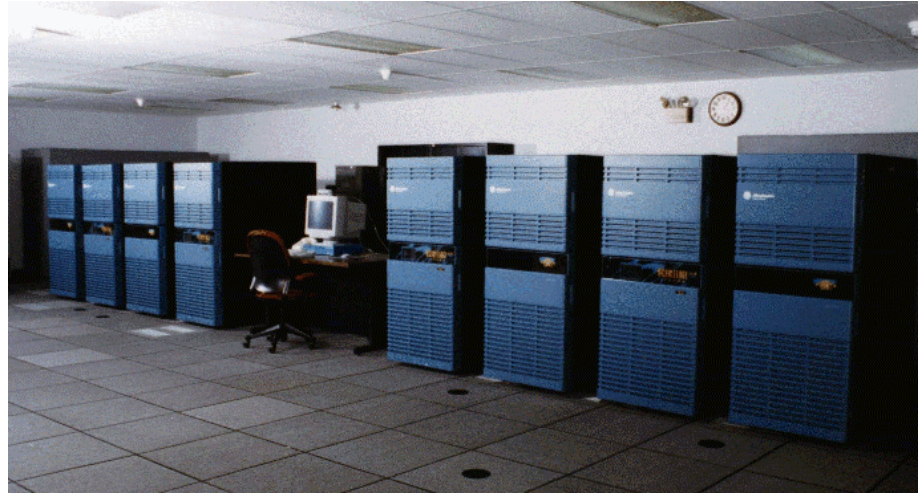
HYBRID



The Crew Station/Turret Motion Base Simulator CS/TMBS is a high capacity six (6) degree of freedom test device. This system is capable of reproducing dynamic conditions encountered by combat vehicle crew stations and turret systems traversing secondary roads and cross-country terrain.



Power Challenge Array



The TACOM-TARDEC Power Challenge Array is connected to the TARDEC network through an Asynchronous Transfer Mode (ATM) switch with an ATM interface (155 Mb/sec) in each of the 4 nodes which make up the Power Challenge Array. All 4 nodes are also connected to each other via HiPPI interface. It also has connections to the existing Fiber Distributed Data Interface (FDDI) ring and Ethernets (10 Mb/sec) within the TACOM-TARDEC HPC Center. This will provide access to the HPC from other TACOM-TARDEC networks. External users will be able to access the HPC through our T-1 connections to MichNet and the Defense Research Engineering Network (DREN).

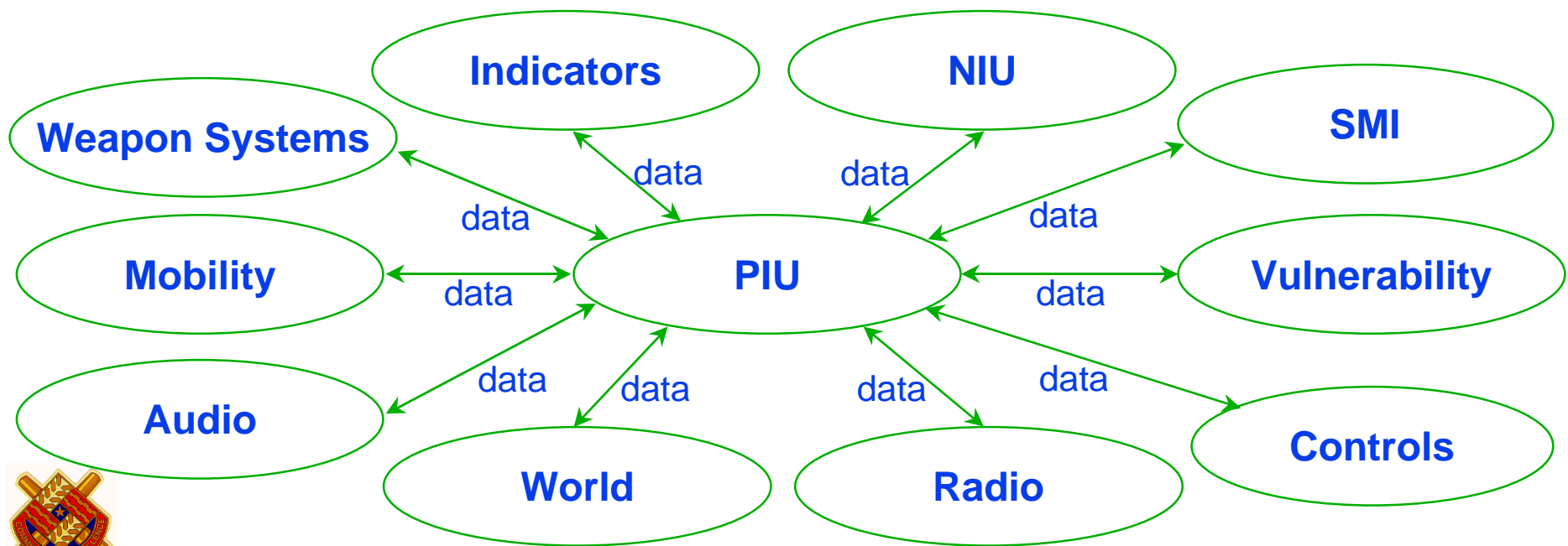


- GOAL
 - Making the VSF HLA Compliant
 - Creating HLA Information Documentation for TARDEC
 - Research the best implementation of HLA for all TARDEC Labs
 - Long Haul Network with other Army Labs using HLA
- What's needed:
 - Install RTI 1.0 (Complete)
 - Install HLA/DIS Gateway (Complete)
 - Create a VSF HLA Minimal Example
 - Participate in Long Haul Network Federation Exercise

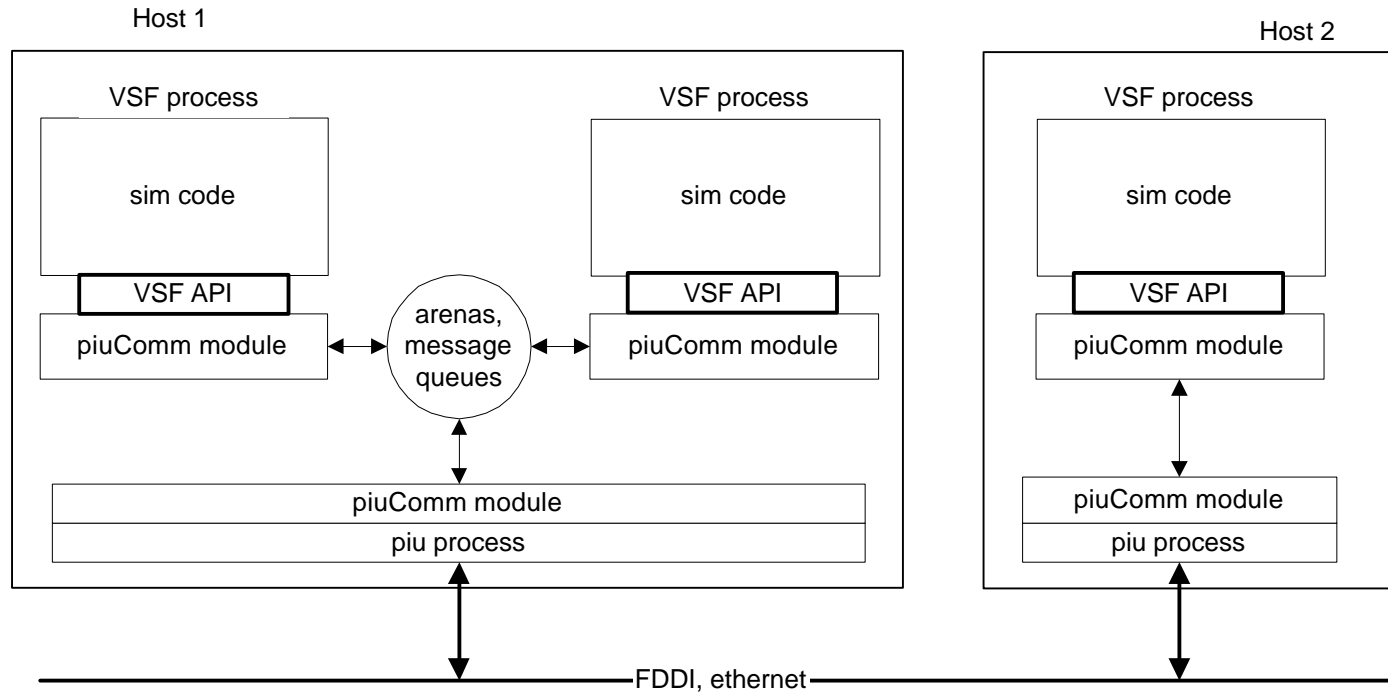


Process Interface Unit (PIU)

- The PIU is the software module that binds the independent software modules together into one cohesive vehicle.
- The PIU serves as an intermediary for all data shared between the software modules.
- To send data between modules, a sending module sends data to the PIU. The PIU then routes the data to the defined destination modules. Direct communication between modules does not take place.



Model-Level Interoperability



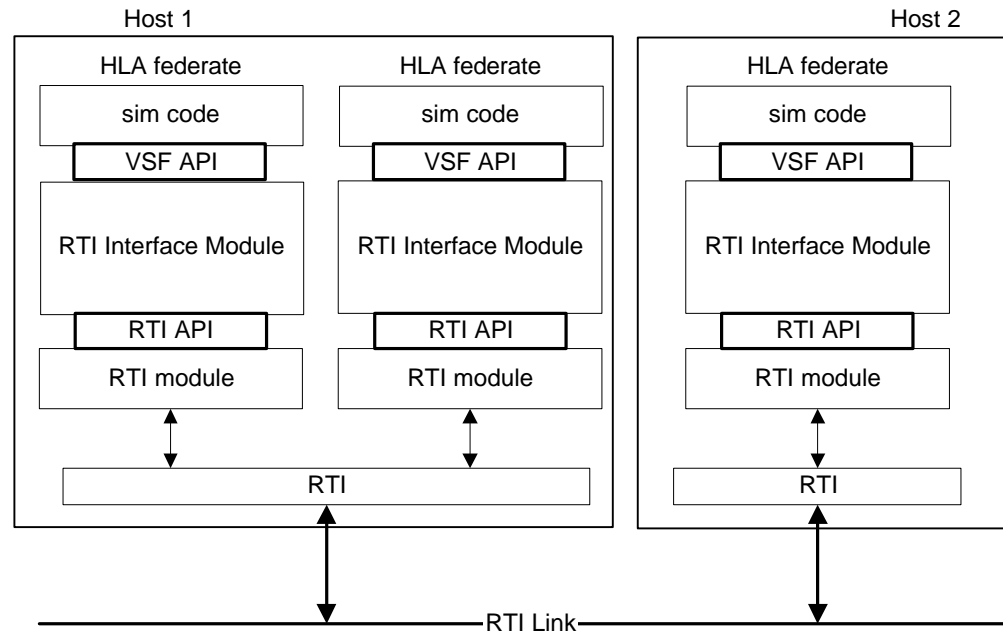
The VSF uses the PIU to Achieve Model-level Interoperability



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An RTI Interface Module



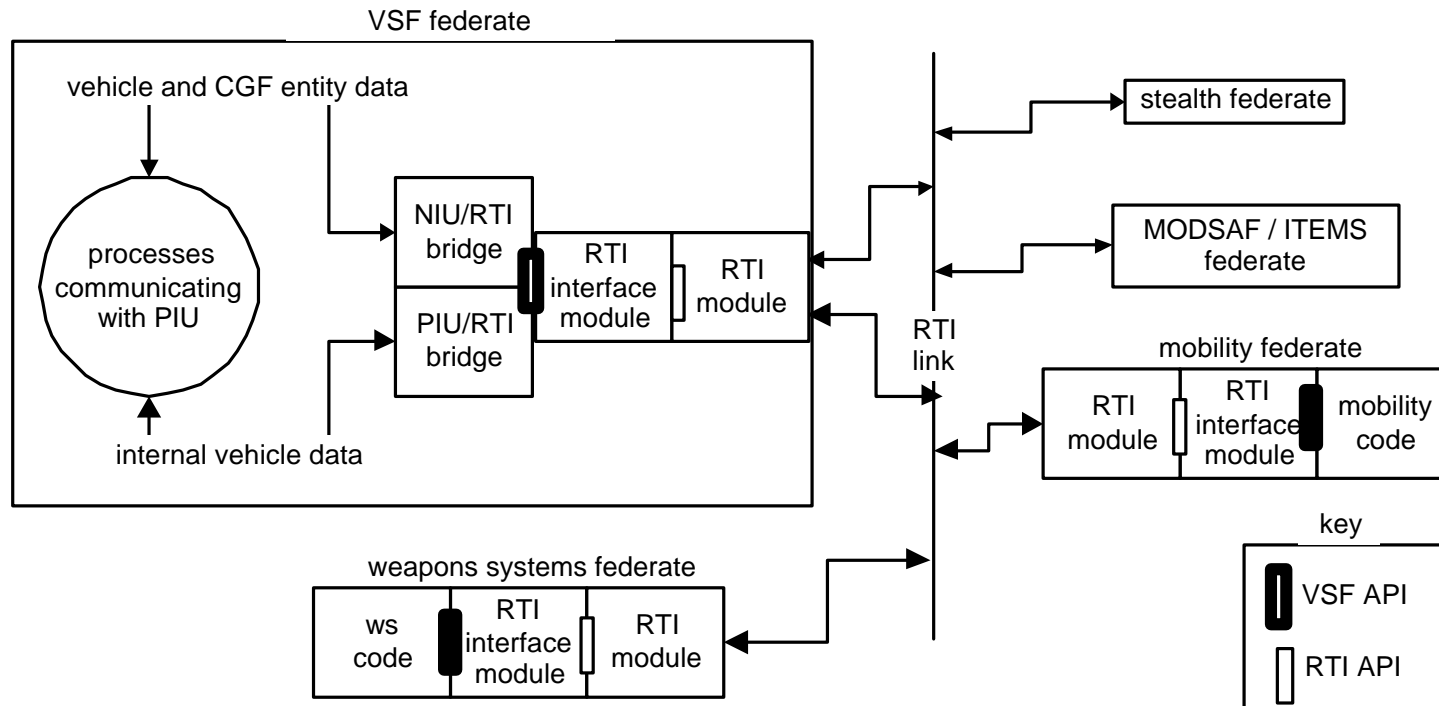
The RTI Interface Module



- 1. Vehicle-level minimal level
- 2. CGF-Level minimal
- 3. Combine Vehicle-CGF Level
- 1, 2, and 3 are NIU related
- 4. Model Level Minimal
- 4 is PIU related
- 5. Model-level with other vehicle & CGFs
- 5 is a complete minimal VSF



An HLA-Compliant VSF



The VSF federate must conduct two types of external information exchange between federates:

- (1) vehicle DIS-entity-type data with the ModSAF/ITEMS & Stealth federates
- (2) internal vehicle information with the mobility & weapon systems models

